

CLAIMS

[1] - An endoscope device comprising an elongate inserting unit (10),
wherein said inserting unit (10) comprises:
plurality of objective optical means (11), having a predetermined view angle,
5 mounted so as to be oriented in different viewing field directions from one another;
transmission optical means (12, 13, 14) for transmitting a light flux entering
each of said objective optical means (11); and
imaging means (15) for imaging respective optical images formed when the
light flux transmitted by said transmission optical means (12, 13, 14) is converged.

10 [2] The endoscope device according to claim 1,
wherein:
said objective optical means (11) are disposed so as to have peripheral portions
of their respective viewing fields overlap peripheral portions of viewing fields of adjoining
other objective optical means (11); and

15 said imaging means (15) images an optical image of a light flux captured
within a view angle extending, with no discontinuation, over a wider range than the view
angle of each objective optical means (11).

[3] - An endoscope device comprising an elongate inserting unit (10),
wherein said inserting unit (10) comprises:
20 three or more objective lenses (11), having a predetermined view angle,
mounted so as to be oriented in different viewing field directions from one another;
a transmission optical system (12, 13, 14) for transmitting light fluxes entering
said respective objective lenses (11); and
an imaging element (15) for imaging respective optical images formed when
25 the light fluxes transmitted by said transmission optical system (12, 13, 14) are converged
on three or more regions.

[4] The endoscope device according to claim 3,

wherein:

 said objective lenses (11) are disposed so as to have peripheral portions of their respective viewing fields overlap peripheral portions of viewing fields of adjoining other objective lenses (11); and

5 said imaging element (15) images, on at least three regions, optical images of light fluxes captured within a view angle extending, with no discontinuation, over a wider range than the view angle of each objective lens (11).

[5] An endoscope device comprising an elongate inserting unit (10) and an operation unit (2) connected to said inserting unit (10), wherein said endoscope device 10 comprises:

 plurality of objective optical means (11), disposed at said inserting unit (10), having a predetermined view angle, and mounted so as to be oriented in different viewing field directions from one another;

 transmission optical means (12, 13, 14), disposed at said inserting unit (10), for 15 transmitting light fluxes entering said respective objective optical means (11);

 light carrying means, disposed at said inserting unit (10), for carrying the light fluxes transmitted by said transmission optical means (12, 13, 14) between said inserting unit (10) and said operation unit (2) toward imaging means; and

 imaging means (15), disposed at said operation unit (2), for imaging respective 20 optical images formed when the light fluxes transmitted by said transmission optical means (12, 13, 14) and carried by said light carrying means are converged.

[6] An endoscope device comprising an elongate inserting unit (10), wherein said inserting unit (10) comprises:

 plurality of objective optical means (11), having a predetermined view angle, 25 disposed so as to have different viewing field directions from one another;

 transmission optical means (12, 13, 14), having different optical axes from one another, for independently transmitting light fluxes entering said respective objective

optical means (11) along the optical axes; and

imaging means (15) for imaging respective optical images formed when the light fluxes transmitted by said transmission optical means (12, 13, 14) are converged.

[7] The endoscope device according to claim 6,

5 wherein said endoscope device further comprises image selection means for selecting a part of the optical images imaged by said imaging means (15).

[8] The endoscope device according to claim 6,

wherein said endoscope device further comprises three-dimensional image generation means for generating a three-dimensional panoramic image by combining the 10 respective optical images converged by said imaging means (15).

[9] An endoscope device comprising an elongate inserting unit (10),

wherein said inserting unit (10) comprises:

illumination means for irradiating a testing target part with a ray of light supplied from a predetermined light source device;

15 plurality of objective optical means (11), mounted so as to be oriented in different viewing field directions from one another, for receiving a reflection light of the ray of light irradiated by said illumination means, within a predetermined view angle;

transmission optical means (12, 13, 14) for transmitting a light flux entering each of said objective optical means (11); and

20 imaging means (15) for imaging each optical image formed when the light flux transmitted by said transmission optical means (12, 13, 14) is converged.

[10] An imaging method by an endoscope device comprising an elongate inserting unit (10),

wherein said inserting unit (10) comprises a plurality of objective optical 25 systems (11) having a predetermined view angle and mounted so as to be oriented in different viewing field directions from one another, a transmission optical system (12, 13, 14) for transmitting a light flux entering each objective optical system (11), and an imaging

element (15) for imaging each optical image formed when the light flux transmitted by said transmission optical system (12, 13, 14) is converged;

wherein said imaging method comprises:

capturing testing target parts, by said respective objective optical systems (11),

5 within their respective viewing fields which partially overlap with viewing fields of adjoining other objective optical systems (11); and

simultaneously imaging, by said imaging element (15), optical images of the testing target parts captured within a view angle extending, with no discontinuation, over a wider area than the view angle of each objective optical system.

10 [11] . An imaging method by an endoscope device and an imaging device optically connected to said endoscope device,

wherein said imaging method comprises:

preparing an endoscope device, in which a plurality of objective optical systems (11) mounted so as to be oriented in different viewing field directions from one 15 another for receiving, within a predetermined view angle, reflection lights from testing target parts irradiated with an illumination light, and a transmission optical system (12, 13, 14) for transmitting light fluxes entering said respective objective optical systems (11), are disposed;

capturing, by said respective objective optical systems (11), the testing target 20 parts, within respective viewing fields which partially overlap with viewing fields of adjoining other objective optical system (11); and

receiving, by an imaging device (15), optical signals of optical images of the testing target parts formed when light fluxes transmitted by said transmission optical system (12, 13, 14) and carried from said endoscope device are converged, and 25 demodulating the optical signals and imaging the optical images of the testing target parts.

[12] . An imaging method by an endoscope device comprising an elongate inserting unit (10) and an operation unit (2) connected to said inserting unit via a connection unit,

wherein:

objective optical systems (11) having a predetermined view angle and mounted so as to be oriented in different viewing field directions from one another, and a transmission optical system (12, 13, 14) for transmitting light fluxes entering said 5 respective objective optical systems (11) are disposed at said inserting unit (10);

light carrying means for converting light fluxes transmitted by said transmission optical system (12, 13, 14) into optical signals and carrying them is disposed at said connection unit; and

demodulation means for demodulating the optical signals carried by said light 10 carrying means, and an imaging element (15) for receiving the optical signals demodulated by said demodulation means and imaging optical images based on the optical signals are disposed at said operation unit (2),

wherein said imaging method comprises:

capturing, by said respective objective optical systems (11), testing target parts 15 within respective viewing fields which partially overlap with viewing fields of adjoining other objective optical systems (11); and

imaging, by said imaging element (15), optical images of the testing target parts based on optical signals originating from demodulated light fluxes transmitted by said transmission optical system (12, 13, 14).